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Applications of HCMM Satellite Data to the Study of Urban Heating Patterns

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Summary of Research

Although no additional HCMM data has been received since the previous quarter, except for some standard imagry, we have made substantial progress in our data processing scheme. In particular, we have now completed the entire program stream in which a surface boundary layer model is joined to the process to allow one to infer the surface energy budget (H_o, E_o, G_o) and the dominant surface parameters (M, P) from a pair of day-night temperature maps rectified to a single grid reference frame. The program stream outlined in Figure 1 combines the model output statistics with the pair of rectified infrared brightness temperatures to produce analyzed maps of the necessary fields. Tests with simulated data indicate that the system functions rather well. Initial experiments with real HCMM data will be done using measurements made over Los Angeles and St. Louis.

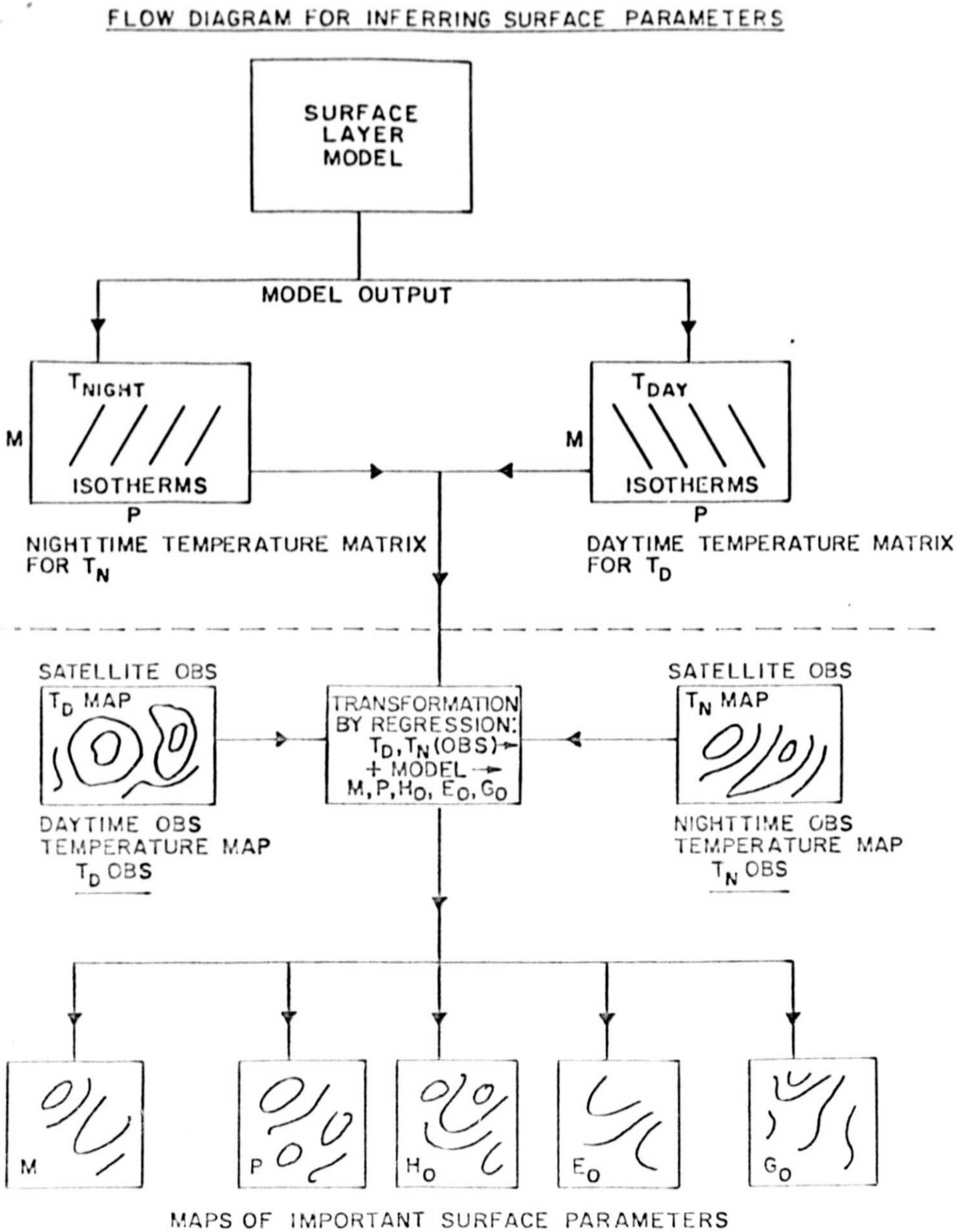
FLOW DIAGRAM FOR INFERRING SURFACE PARAMETERS
SURFACE LAYER MODEL
MODEL OUTPUT
T_{NIGHT}
M
ISOTHERMS
P
NIGHTTIME TEMPERATURE MATRIX FOR T_N
T_{DAY}
M
ISOTHERMS
P
DAYTIME TEMPERATURE MATRIX FOR T_D
SATELLITE OBS
T_D MAP
DAYTIME OBS TEMPERATURE MAP
T_D OBS
TRANSFORMATION BY REGRESSION:
T_D, T_N (OBS) →
+ MODEL →
M, P, H_O, E_O, G_O
SATELLITE OBS
T_N MAP
NIGHTTIME OBS TEMPERATURE MAP
T_N OBS
M
P
H_O
E_O
G_O
MAPS OF IMPORTANT SURFACE PARAMETERS

Figure 1